U.S. Environmental Protection Agency

Integrated Risk Information System

1,1,1-Trichloroethane (CASRN 71-55-6)

view QuickView

List of IRIS Substances

Select a Substance go

Full IRIS Summary QuickView

MAIN CONTENTS

Reference Dose for Chronic Oral Exposure (RfD) go

0197

1,1,1-Trichloroethane; CASRN 71-55-6

Health assessment information on a chemical substance is included in IRIS only after a comprehensive review of chronic toxicity data by U.S. EPA health scientists from several Program Offices and the Office of Research and Development. The summaries presented in Sections I and II represent a consensus reached in the review process. Background information and explanations of the methods used to derive the values given in IRIS are provided in the Background Documents.

STATUS OF DATA FOR 1,1,1-Trichloroethane

File First On-Line 03/31/1987

Category (section)	Status	Last Revised
Oral RfD Assessment (I.A.)	withdrawn	02/01/1996
Inhalation RfC Assessment (I.B.)	no data	
Carcinogenicity Assessment (II.)	on-line	09/01/1990

_I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

_I.A. Reference Dose for Chronic Oral Exposure (RfD)

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6

The oral RfD for 1,1,1-trichloroethane has been withdrawn on 08/01/1991 pending further review by the RfD/RfC Work Group.

Screening-Level Literature Review Findings -- A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the RfD for 1,1,1-Trichloroethane conducted in November 2001 identified one or more significant new studies. IRIS users may request the references for those studies from the IRIS Hotline at hotline.iris@epa.gov or (202)566-1676.

183303

004408

EPA Contacts:

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

Back to top

_I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6

Not available at this time.

Back to top

_II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6
Last Revised -- 09/01/1990

Section II provides information on three aspects of the carcinogenic assessment for the substance in question; the weight-of-evidence judgment of the likelihood that the substance is a human carcinogen, and quantitative estimates of risk from oral exposure and from inhalation exposure. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. The rationale and methods used to develop the carcinogenicity information in IRIS are described in The Risk Assessment Guidelines of 1986 (EPA/600/8-87/045) and in the IRIS Background Document. IRIS summaries developed since the publication of EPA's more recent Proposed Guidelines for Carcinogen Risk Assessment also utilize those Guidelines where indicated (Federal Register 61(79):17960-18011, April 23, 1996). Users are referred to Section I of this IRIS file for information on long-term toxic effects other than carcinogenicity.

_II.A. Evidence for Human Carcinogenicity

__II.A.1. Weight-of-Evidence Characterization

Classification -- D; not classifiable as to human carcinogenicity.

Basis -- There are no reported human data and animal studies (one lifetime gavage, one intermediate-term inhalation) have not demonstrated carcinogenicity. Technical grade 1,1,1-trichloroethane has been shown to be weakly mutagenic, although the contaminant, 1,4-dioxane, a known animal carcinogen, may be responsible for this response.

__II.A.2. Human Carcinogenicity Data

None.

__II.A.3. Animal Carcinogenicity Data

Inadequate. The NCI (1977) treated Osborne-Mendel rats (50/sex/dose) with 750 or 1500 mg/kg technical-grade 1,1,1-trichloroethane 5 times/week for 78 weeks by gavage. The rats were observed for an additional 32 weeks. Twenty rats of each sex served as untreated controls. Low survival of both male and female treated rats (3%) may have precluded detection of a significant number of tumors late in life. Although a variety of neoplasms was observed in both treated and matched control rats, they were common to aged rats and were not dose-related. Similar results were obtained when the NCI (1977) treated B6C3F1 hybrid mice with the time-weighted average doses of 2807 or 5615 mg/kg 1,1,1-trichloroethane by gavage 5 days/week for 78 weeks. The mice were observed for an additional 12 weeks. The control and treated groups had 20 and 50 animals of each sex, respectively. Only 25 to 45% of those treated survived until the time of terminal sacrifice. A variety of neoplasms were observed in treated groups, but the incidence not statistically different from matched controls.

Quast et al. (1978) exposed 96 Sprague-Dawley rats of both sexes to 875 or 1750 ppm 1,1,1-trichloroethane vapor for 6 hours/day, 5 days/week for 12 months, followed by an additional 19-month observation period. The only significant sign of toxicity was an increased incidence of focal hepatocellular alterations in female rats at the highest dosage. It was not evident that a maximum tolerated dose (MTD) was used nor was a range-finding study conducted. No significant dose-related neoplasms were reported, but these dose levels were below those used in the NCI study.

__II.A.4. Supporting Data for Carcinogenicity

Mutagenicity testing of 1,1,1-trichloroethane has produced positive results in S. typhimurium strain TA100 (Simmon et al., 1977; Fishbein, 1979; Snow et al., 1979) as well as some negative results (Henschler et al., 1977; Taylor, 1978).

It was mutagenic for S. typhimurium strain TA1535 both with exogenous metabolic activation (Farber, 1977) and without activation (Nestmann et al., 1980). 1,1,1-Trichloroethane did not result in gene conversion or mitotic recombination in Saccharomyces cerevisiae (Farber, 1977; Simmon et al., 1977) nor was it positive in a host-mediated forward mutation assay using Schizosaccharomyces pombe in mice. The chemical also failed to produce chromosomal aberrations in the bone marrow of cats (Rampy et al., 1977), but responded positively in a cell transformation test with rat embryo cells (Price et al., 1978).

An isomer, 1,1,2-trichloroethane, is carcinogenic in mice, inducing liver cancer and pheochromocytomas in both sexes. Dichloroethanes, tetrachloroethanes and hexachloroethanes also produced liver cancer in mice and other types of neoplasms in rats.

It should be noted that 1,4-dioxane, a known animal carcinogen that causes liver and nasal tumors in more than one strain of rats and hepatocellular carcinomas in mice, is a contaminant of technical-grade 1,1,1-trichlorethane.

Back to top

_II.B. Quantitative Estimate of Carcinogenic Risk from Oral Exposure

Not available.

Back to top

_II.C. Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure

Not available.

Back to top

_II.D. EPA Documentation, Review, and Contacts (Carcinogenicity Assessment)

__II.D.1. EPA Documentation

Source Document -- U.S. EPA, 1984a,b

The 1984 Health Effects Assessment for 1,1,1-Trichloroethane has received limited Agency review. The values in the 1984 Health Assessment Document for 1,1,1-Trichloroethane have received both Agency and public review.

__II.D.2. EPA Review (Carcinogenicity Assessment)

Agency Work Group Review -- 08/05/1987

Verification Date -- 08/05/1987

Screening-Level Literature Review Findings -- A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the cancer assessment for 1,1,1-Trichloroethane conducted in November 2001 did not identify any critical new studies. IRIS users who know of important new studies may provide that information to the IRIS Hotline at hotline.iris@epa.gov or (202)566-1676.

__II.D.3. EPA Contacts (Carcinogenicity Assessment)

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

Back to top

_III. [reserved]
_IV. [reserved]
_V. [reserved]

_VI. Bibliography

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6
Last Revised -- 08/01/1991

_VI.A. Oral RfD References

Not available at this time.

Back to top

_VI.B. Inhalation RfD References

None

Back to top

_VI.C. Carcinogenicity Assessment References

Farber, H. 1977. Manager of Environmental Affairs, Dow Chemical letter to James Price, Chief of Air Quality Data Analysis, Texas Air Control Board, Austin, TX. (Cited in: NCI, 1977)

Fishbein, L. 1979. Potential halogenated industrial carcinogenic and mutagenic chemicals. II. Halogenated saturated hydrocarbons. Sci. Total Environ. 11: 163.

Henschler, D., E. Eder, T. Neudecker and M. Metzler. 1977. Carcinogenicity of trichloroethylene: Fact or artifact? Arch. Toxicol. 37: 233-236.

NCI (National Cancer Institute). 1977. Bioassay of 1,1,1-trichloroethane for possible carcinogenicity. Carcinog. Tech. Rep. Ser. No. 3, NCI-CG-TR-3.

Nestmann, E.R., E.G.H. Lee, T.I. Matula, G.R. Douglas and J.C. Mueller. 1980. Mutagenicity of constituents identified in pulp and paper mill effluents using the Salmonella/mammalian-microsome assay. Mutat. Res. 79: 203-212.

Price, P.J., C.M. Hassett and J.I. Mansfield. 1978. Transforming activities of trichloroethylene and proposed industrial alternatives. In vitro. 14: 290-293.

Quast, J.F., B.K.J. Leong, L.W. Rampy and P.J. Gehring. 1978. Toxicologic and carcinogenic evaluation of a methylchloroform (1,1,1-trichloroethane) formulation by chronic inhalation in rats - interim report after 24 months. Dow Chemical Co., Midland, MI.

Rampy, L.W., J.F. Quast, B.K.J. Leong and P.J. Gehring. 1977. Results of long-term inhalation toxicity studies on rats of 1,1,1-trichloroethane and perchloroethylene formulations. In: Proc. Int. Cong. Toxicol. Toronto.

Simmon, V.F., K. Kauhanen and R.G. Tardiff. 1977. Mutagenic activity of chemicals identified in drinking water. In: Progress in Genetic Toxicology, D. Scott et al., Ed.

004412

Elsevier/North Holland Biomedical Press, Amsterdam.

Snow, L.P., B.C. Nair and B.C. Castro. 1979. Mutagenesis testing of methylene chloride and 1,1,1-trichloroethane in Salmonella strains TA100 and TA98. Northrop Services, Inc., Research Triangle Park, NC.

Taylor, G. 1978. Personal communication. NIOSH, Morgantown, WV. (Cited in: U.S. EPA, 1984a)

U.S. EPA. 1984a. Health Effects Assessment for 1,1,1-Trichloroethane. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Emergency and Remedial Response, Washington, DC.

U.S. EPA. 1984b. Health Assessment Document for 1,1,1-Trichloroethane. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA-600/8-82-003F.

Back to top

_VII. Revision History

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6

Date	Section	Description
09/30/1987	IV.	Regulatory Action section on-line
03/01/1988	I.A.4.	Text clarified
06/30/1988	IV.B.2.	Units corrected for MCL
06/30/1988	I.A.7.	Contacts switched
09/07/1988	II.	Carcinogen summary on-line
06/01/1989	II.D.3.	Secondary contact deleted
03/01/1990	VI.	Bibliography on-line
05/01/1990	I.A.	Oral RfD summary noted as pending change
05/01/1990	I.B.	Inhalation RfC now under review
09/01/1990	I.A.	Text edited
09/01/1990	II.	Text edited
09/01/1990	III.A.	Health Advisory on-line
09/01/1990	IV.F.1.	EPA contact changed
09/01/1990	VI.C.	Snow et al. 1979 citation clarified
09/01/1990	VI.D.	Health Advisory references added
08/01/1991	I.A.	Withdrawn pending further review
08/01/1991	VI.A.	Oral RfD references withdrawn
08/01/1991	VI.C.	Citations clarified
01/01/1992	IV.	Regulatory actions updated
10/01/1992	IV.B.1.	MCLG value corrected
10/01/1992	IV.B.2.	MCL value corrected
04/01/1993	IV.C.1.	Withdrawn; mandated by National Toxics Rule

08/01/1995	I.A., I.B., VI.A.	EPA's RfD/RfC and CRAVE workgroups were discontinued in May, 1995. Chemical substance reviews that were not completed by September 1995 were taken out of IRIS review. The IRIS Pilot Program replaced the workgroup functions beginning in September, 1995.
02/01/1996	I.A.	Contact changed
09/01/1996	III.A.5.	DWEL withdrawn
04/01/1997	III., IV., V.	Drinking Water Health Advisories, EPA Regulatory Actions, and Supplementary Data were removed from IRIS on or before April 1997. IRIS users were directed to the appropriate EPA Program Offices for this information.
01/09/2002	I., II.	This chemical is being reassessed under the IRIS Program.
12/03/2002	I.A., II.D.2.	Screening-Level Literature Review Findings message has been added.

Back to top

_VIII. Synonyms

Substance Name -- 1,1,1-Trichloroethane
CASRN -- 71-55-6
Last Revised -- 03/31/1987

71-55-6
AEROTHENE TT
CHLOROETENE
CHLOROETHENE
CHLOROETHENE NU
CHLOROFORM, METHYL-
CHLOROTHANE NU
CHLOROTHENE
CHLOROTHENE NU
CHLOROTHENE VG
CHLORTEN
ETHANE, 1,1,1-TRICHLORO-
INHIBISOL
METHYLCHLOROFORM
METHYLTRICHLOROMETHANE
NCI-C04626
RCRA WASTE NUMBER U226
STROBANE
alpha-T
1,1,1-TCE
1,1,1-TRICHLOORETHAAN
1,1,1-TRICHLORAETHAN
Trichloroethane, 1,1,1-
alpha-TRICHLOROETHANE
1,1,1-TRICLOROETANO
TRI-ETHANE
UN 2831

Back to top

Recent Additions | Search IRIS | IRIS Home | NCEA Home | ORD Home

EPA Home | Privacy and Security Notice | Contact Us

Last updated on Thursday, November 18th, 2004
URL: http://www.epa.gov/iris/subst/0197.htm